

[002] This application is a national stage completion of PCT/EP2003/012371 filed November 6, 2003 which claims priority from German Application Serial No. 102 52 429.7 filed November 12, 2002.

[003] FIELD OF THE INVENTION

[004] ~~According to the preamble of claim 1~~ The invention concerns an electro- pneumatic switching unit. ◆◆

[005] BACKGROUND OF THE INVENTION

[011] SUMMARY OF THE INVENTION

[013] BRIEF DESCRIPTION OF THE DRAWINGS

[014] The invention is ~~explained in detail~~ will now be described, by way of example, with reference to the accompanying drawings in which shows: ◆◆

[019] DETAILED DESCRIPTION OF THE INVENTION

[025] To prevent erroneous switchings, additional fuse protections have to be present in the switching device. To that end, one gate locking cylinder 54 is provided which preferably in the slow ratio step of the range-change group transmission, above a certain output rotational speed of the transmission 6, prevents the switching from the right switching gate of the gear shift pattern 28 to the left switching gate, that is, the switching from the third or fourth ratio step to the first or second ratio step is prevented. This should keep the vehicle driver from erroneously switching to the first, instead of to the fifth ratio step, when he has forgotten to preselect the quick ratio in the range-change group transmission 14 with the toggle switch 24. Air exists on the gate locking cylinder 54 only when the main disengaging valve 42 in the neutral position of the main transmission part 10 allows air into the valves 44 and 46 and when the valve 44, which is here to engage the slow position, here the slow position of the range-change group transmission 14 should turn on, is controlled by the control ◆◆

device 20. The gate locking cylinder 54 is directly connected with the output of said valve. In the gear shift pattern 28, if the gear lever 16 is in the position for the fourth ratio step, the range-change group transmission 14 is then in the slow position. The output rotational speed of the transmission 6 is detected by a sensor 50 and relayed as a signal to the electronic control device 20. If the gear lever 16 is brought to the neutral position, air flows via the main disconnecting valve 42 to the valves 44 and 46. When the output rotational speed is too high, the control device 20 emits one signal to the valve 44, which opens and allows air to reach the gate locking shaft 48 via a line 80 and presses the latter in direction of the right switching gate of the gear shift pattern 28. If the vehicle driver preselects the quick ratio in the range-change group transmission 14 with the toggle switch 24, the valve 44 closes and the valve 46 opens. Thereby no more air exists on the gate locking cylinder 54 and the gear lever can be passed into the left switch gate in the gear shift pattern 28. This arrangement can be over-pressurable by the vehicle driver at increased cost in power and thus allow the switching of the ratio steps to the left switch gate of the gear shift pattern 28 in extreme situations.

[028] Fig. 4 shows a modification of the arrangement of Fig. 3. The gate locking cylinder 54 is here likewise integrated in the valve block 60 and the modularity and complexity of the valve block 60 are thus further increased. The clutch pedal 62 actuates here an electric switch 64 connected with the control device 20. The admission of switchings in the splitter group transmission 12 is determined in this arrangement by the control device 20 when the switch 64 is closed, air permanently outcropping on the valves 36 and 38.

1-2. (CANCELED)

3. (NEW) An electro-pneumatic switching unit for a vehicle transmission (6) comprising;

- one splitter group transmission (12) pneumatically switched via a first set of valves (36, 38);

- one range-change group transmission (14) pneumatically switched via a second set of valves (44, 46), the switchings of which can be manually preselected by a vehicle driver on a gear lever (16);

- one locking device (54, 56) for mechanically preventing the manual switching of inadmissible reduction ratios of a vehicle transmission (6);

- one device (30, 42, 64) for preventing pneumatic switching of the inadmissible reduction ratios of the vehicle transmission (6);

- one electronic control device (20),

- wherein the locking device (54, 56) for mechanically preventing the manual switching of inadmissible reduction ratios of the vehicle transmission (6) is pneumatically connected with a first valve (44) of the second set of valves (44, 46) for switching the range-change group transmission (14).

4. (NEW) The electro-pneumatic switching unit according to claim 3, wherein the locking device (54, 56) is pneumatically connected with the first valve (44) of the second set of valves (44, 46) for switching the position slow of the range-change group transmission (14).